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# End To End System Analysis

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# Agenda



<b>Overview And Context</b>	<b>0815 - 0840</b>	<b>Armstrong</b>
<b>Modeling Methodology</b>	<b>0840 - 0930</b>	<b>Singer</b>
<b>Assumptions, Functions and Parameters</b>	<b>0930 - 1100</b>	<b>Modeling Team</b>
<b>Scenarios</b>	<b>1100 - 1230</b>	<b>Miller</b>
<b>&lt;LUNCH&gt;</b>		
<b>Sources for Model Input</b>	<b>1400 - 1430</b>	<b>Armstrong</b>
<b>Hardware Specification</b>	<b>1430 - 1500</b>	<b>Miller</b>

# Overview and Context (Why are we here?)



- At IDR, we briefed an approach to developing an “end to end” model. The IDR Review Panel specifically requested two reviews prior to Release B CDR to ensure that ECS stayed on track:
  - Review 1: Assumptions and Scenarios
  - Review 2: Preliminary Results
- To date, modeling activities
  - *have* focused on system resources that are in contention for both production and distribution, and on “tall poles” from a cost point of view.
  - have *not* analyzed all of the subsystem hardware components.
  - have *not* analyzed transactions between all subsystems.

At IDR, infrastructure (i.e., communications and management overhead) was a specific area of concern.
- This is the first of two modeling workshops and focuses on assumptions and scenarios.



# Workshop Objectives

- **To provide insight to the Hughes modeling approach, and the use of specific modeling techniques to size various portions of the system.**
  - static
  - dynamic
  - queueing
- **To provide (and obtain comments on) assumptions, basis functions, and parameters that are being used to model the system.**
- **To obtain feedback on system scenarios to be used to depict and model end-to-end data flows**
  - nominal loads
  - peak loads
  - excursions from current requirements (what if's)
- **To explain the methodology for hardware sizing and capacity planning, as related to modeling**



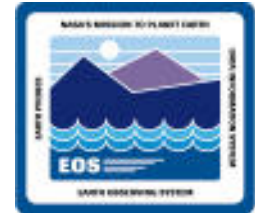
# Modeling Approaches

Models used by ECS vary in their *breadth* and *depth*:

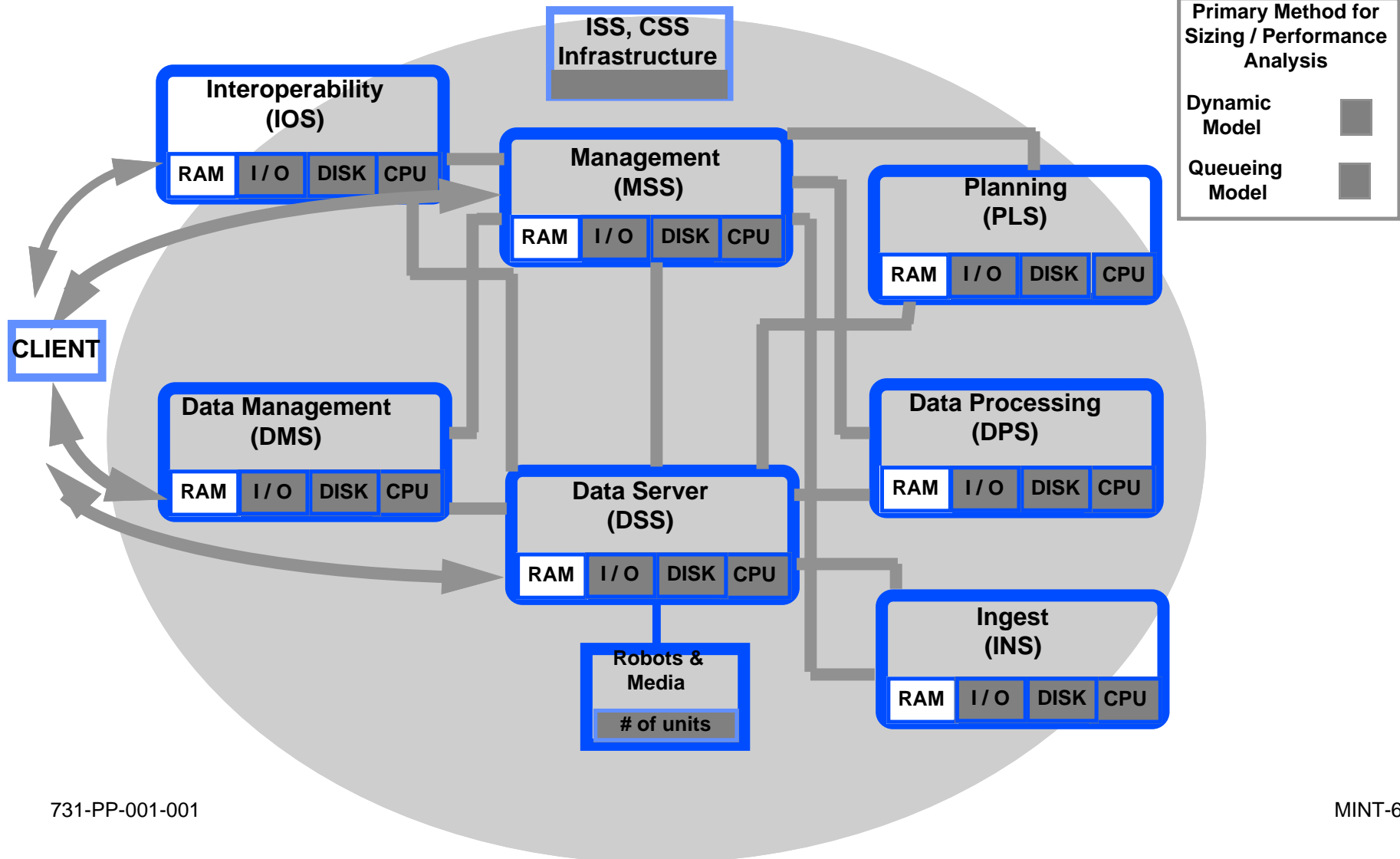
- The Static Model of the AHWGP inputs provides coarse system sizing for the subsystems impacted by the “Push” load.
- The ECS Dynamic Model covers a portion of the system in significant detail, and is useful for sizing system components within the subsystems it covers.
- The ECS Queueing Model covers the whole system with less detail, and is useful for predicting high-level system behavior.
- Results from multiple models will be assimilated in an End To End System Model.

End to End means that all ECS subsystems are analyzed, using scenarios that take into consideration the system requirements and the candidate hardware design. The End to End model will be implemented using the queueing model.

Models are driven by inputs from the technical baseline, system assumptions, benchmark results (e.g., for COTS products), and transaction analysis.



# ECS System / Modeling Context



# Assumptions, Parameters and Basis Functions



- **Assumptions - Conditions or suppositions that are posited as true. Categories include**
  - System- level assumptions
  - Input assumptions
  - Archive assumptions
  - Processing assumptions
  - Reprocessing assumptions
  - Modeling assumptions
- **Parameters - Parameters (constants) that are entered into the model (e.g, hardware characteristics).**
- **Basis Functions - Functions that describe the operation or response of an object within the model (e.g., statistics of stochastic loads, equations that calculate hardware response times).**

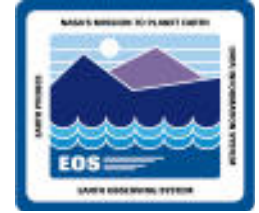
# End to End Modeling: Scenarios and Threads



- **Scenarios are used to describe the system activities and associated load on the system at a given point in time.**
- **Scenarios are comprised of threads which show, at a lower level, the path of a user's request through the system.**
- **Scenarios and threads have been chosen based on an analysis of the user model and F&PRS performance requirements.**



# Inputs to Modeling

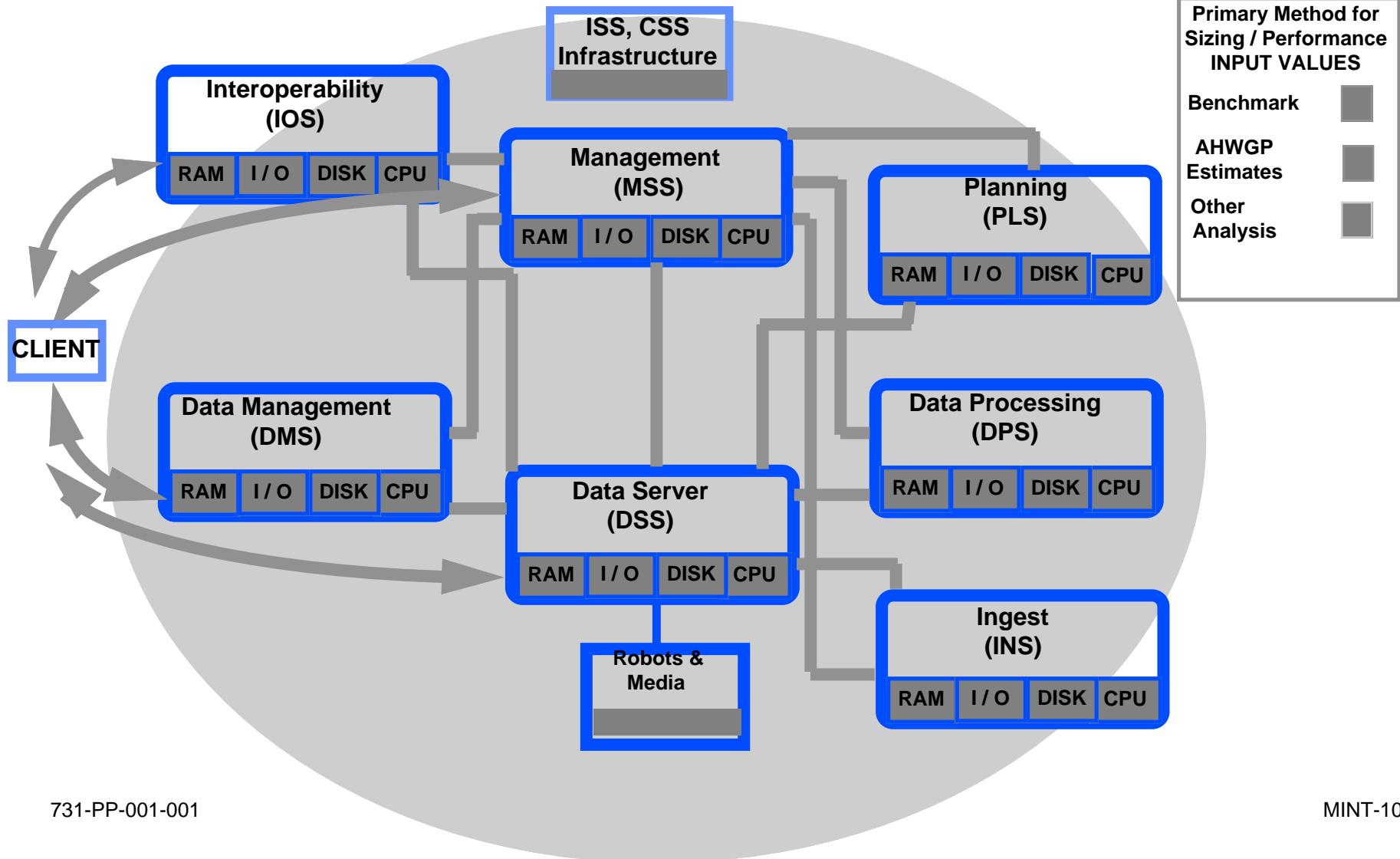


**Low level inputs to modeling (e.g., CPU, I/O requirements and constraints) are based on**

- **The ECS Technical Baseline (MFLOPS per PGE process, dependencies)**
- **Benchmark results**
- **Vendor specifications**
- **Analysis of custom software**

**Examples of these are discussed in the Modeling Inputs briefing.**

# Modeling and Sizing Input Values



# Hardware Specification



**This portion of the briefing describes the process for and results of system hardware specification, and its relationship with modeling efforts.**